Original Article

Etiology and Outcomes of Post-Partum Acute Kidney Injury: A Hospital Based Cross Sectional Study

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ABSTRACT

Objective: This study is designed to determine various risk factors, causes and outcome of Post-Partum Acute Kidney Injury in a tertiary care hospital of Pakistan.

Study Design: Cross sectional / descriptive study

Place and Duration of Study: This study was conducted at the Nephrology Department and MCH Center of PIMS Islamabad from January 1, 2018 to December 31, 2019.

Materials and Methods: 60 patients were included in this study who were previously healthy and developed acute kidney injury in Post-Partum period. A rise of $\geq$ 0.3mg/dl in serum creatinine or urine output $\leq$ 0.5ml/kg/h for 6 hours is defined as Acute Kidney Injury. Detail history was taken though a predesigned form to explore risk factors and causes. Cause of AKI was established though history, through examination and laboratory investigations as required. Course of disease and management was also reviewed. Patients were followed up for 3 months to see disease outcomes. Return to normal renal function was labelled as complete recovery while impaired renal function beyond 3 months during follow up was labelled as CKD.

Results: In our study Puerperal sepsis was the leading cause of post-partum AKI in 35 (58.3%) patients. Second leading cause of PPAKI was pre-eclampsia /eclampsia in 8 (13.4%) patients followed by DIC in 7 (11%) patients and Ante-partum/Post-Partum hemorrhage in 6 (10%) patients. Patients with HELLP were 3 (5%) and HUS 1 (1.6%). Out of 60 patients 12 (20%) patients responded to conservative management while 48 (80%) patients required hemodialysis. During follow up 41 (68.3%) patients achieved complete recovery of renal functions, 15 (25%) patients had partial recovery of renal function and labelled as chronic kidney disease (CKD) while 3 (5%) became dialysis dependent and labelled as ESRD. 1 (1.6%) patient expired during hospital stay due to sepsis.

Conclusion: In our study puerperal Sepsis is the most common cause of Post-Partum Acute Kidney Injury.

Key Words: Acute kidney injury (AKI), Pregnancy, puerperal sepsis

Citation of article: Sultan K, Maqsood Z, Abbasi MSR, Kanwal K, Azhar M, Azhar F. Etiology and Outcomes of Post-Partum Acute Kidney Injury: A Hospital Based Cross Sectional Study. Med Forum 2021;32(7):165-168.

INTRODUCTION

Pregnancy related acute kidney injury (PRAKI) is a major challenge in healthcare system worldwide and is a burden in tertiary care centers carrying high mortality and morbidity[1]. Post-partum acute renal injury (PPAKI) is a major contributor of pregnancy related acute kidney injury which accounts 26-70 percent of total cases of obstetric related AKI[2].

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Received: March, 2021
Accepted: May, 2021
Printed: July, 2021

The incidence of this entity has decreased in developed countries due to good maternity care, health facilities and patient education[3]. In developing countries it is common due to lack of adequate healthcare facilities, poverty and low literacy rate[4]. The main causes of post-partum acute renal failure includes pre-eclampsia/eclampsia, HELLP syndrome, ante-partum hemorrhage, post-partum hemorrhage, puerperal sepsis, disseminated intravascular coagulation (DIC)[5].

Spectrum of etiology of post-partum acute kidney injury is different in developing and developed countries. In developing countries puerperal sepsis is most common cause due to septic abortions, poor maternity care and home deliveries by untrained dies while in developed counties thrombotic microangiopathies (TMAs) are common[6,7].

Acute kidney injury during pregnancy and presentation of previously undiagnosed chronic kidney disease in form of acute kidney injury is also common in clinical setting. Progression of CKD is also accelerated during pregnancy by various pathophysiological mechanism[8]. Pre-existing comorbidities especially hypertension and

diabetes are considerable risk factors for developing AKI during pregnancy[9,10]

Diagnosis of postpartum AKI can be made clinically and by biochemical laboratory results according to KDIGO Guidelines; ≥ 0.3mg/dl increase in serum creatinine from baseline value or ≤ 0.5ml/kg/h urine output for 6 hours. While renal biopsy may be required in selected undiagnosed cases[11].

Post-partum AKI requires aggressive management by multidisciplinary team. Patients may require intensive care unit (ICU) admission and hemodialysis. PPAKI is mostly reversible if treated properly. But unfortunately may lead to chronic kidney disease and Renal Replacement Therapy (RRT) dependency. She H et al reported 37 patients of PPAKI from China. Out of 37 patients 26(70.3%) required ICU and 20 patients required dialysis during hospital stay. 30(81.1%) patients gained normal renal functionss, 1(2.7%) patient gained partial recovery while 1(2.7%) patient became dialysis dependent. 5 patients lost follow up[12].

Identifying the cause of PPAKI and appropriate management is key to achieve good outcomes. Causes of PPAKI are different in different countries. Its causes may also vary in different communities and areas of a same country. Spectrum is also in process of continuous change with improvement of healthcare facilities and literacy rate. So local and recent data is important to manage this clinical challenge.

This study is designed to determine various risk factors, causes and outcome of PPAKI in a tertiary care hospital of Pakistan.

MATERIALS AND METHODS

This cross sectional descriptive study was done after approval of Ethical Review Board of Shaheed Zulfiqar Ali Bhutto Medical University/PIMS Islamabad.

Patients were selected according following criteria;

Inclusion criteria: previously healthy patients who developed AKI in postpartum period.

Exclusion criteria: Patients with known history of renal impairment, diabetes, hypertension, glomerular disease, connective tissue disease, stone disease or previous history of AKI were excluded.

After taking written consent detailed history (age, education and financial status, parity, obstetrical history, history of bleeding, shock, time of stop of urine output) was taken from patients through a predesigned form. They were thoroughly examined and laboratory investigation (complete blood count with peripheral film, Renal and liver functions, serum electrolytes, urine analysis, urine, blood, vaginal and cesarean wound swab culture, bleeding profile, FDP, D Dimer, ultrasound abdomen) were performed to establish a diagnosis.

AKI was defined according to KDIGO (Kidney Disease Improving Global Outcomes) guidelines; a rise of ≥ 0.3mg/dl in serum creatinine or urine output ≤ 0.5ml/kg/h for 6 hours.

Disease course and management (Number of days of hospital stay, requirement of dialysis, need of ICU) was also reviewed. Patients were followed up for 3 months to see disease outcomes. Return to normal renal function was labelled as complete recovery while impaired renal function beyond 3 months during follow was labelled as CKD or partial recovery. Permanent dialysis dependency was labeled as End Stage Renal Disease (ESRD).

RESULTS

Total 60 patients with postpartum AKI were included according to selection criteria. Majority of patients 34 (56.6%) were within age limit 21-30 years. 42 patients (70%) had parity of 3. Of the patients 43 (71.6%) were non-booked and 17(28.3%) were booked. Patients belonged to rural areas were 39 (65%) whereas 21 (35%) were from urban areas. Patients with no formal education were 28 (46.6%), primary education were 12 (20%), middle 10 were (16.6%) and matric or above were 10 (16.6%). Patients belonged to poor socioeconomic status were 48 (80%) having less than 20,000 Rupees income per month. There demographic characteristics are shown in table No. I.

Out of 60 patients, 43 (71%) required cesarean section delivery, 10 (16%) had vaginal delivery and 7 (11%) required evacuation of retained products of conception (ERPC) secondary to incomplete miscarriage

Puerperal sepsis was found to be most common cause of Acute kidney injury in 35 (58.3%) patients, among these 35 patients 27 had cesarean section, 6 had vaginal delivery and 2 had ERPC. Second leading cause of PPAKI was Pre-eclampsia/eclampsia in 8 (13.4%) patients followed by DIC in 7 (11%) patients and Ante-partum/Postpartum hemorrhage in 6 (10%) patients. HELLP was diagnosed in 3 (5%) patients and HUS was found in 1(1.6%).

Table No.1: Demographic detail of patients

Demographic detail		**No of women**	**%age**
Age	21-30 years	34	56.6%
	31-40 years	26	43.3%
area	Rural	39	65%
	Urban	21	35%
income	<20,000	48	80%
	>20,000	12	20%
Education	Uneducated	28	46.6%
	Primary	12	20%
	middle	10	16.6%
	Matric and above	10	16.6%

Patients who stayed more than 7 days at hospital were 49 (81%). Out of all the patients, 12 (20%) patients

responded to conservative management while 48 (80%) patients required hemodialysis. During follow 41 (68.5%) patients achieved complete recovery of renal functions, 15 (25%) patients had partial recovery of renal function and labelled as chronic kidney disease (CKD) while 3 (5%) became dialysis dependent and labelled ESRD. Unfortunately 1 patient (1.6%) expired due to sepsis during hospital stay.

DISCUSSION

The incidence of postpartum AKI in developing countries is very high, mainly due to lack of availability of antenatal care, Die handling and delayed referral of pregnancy related complications like obstructed labour, abruption, eclampsia, antepartum hemorrhage and postpartum hemorrhage.

Puerperal sepsis is the most coommon cause of post-partum AKI in our study which is 58% of total patients. Puerperal sepsis is mainly due to retained products of conception, handling by unskilled birth attendant/Dies in the rural areas, obstructed labour and infected cesarean section. Sepsis leads to AKI by various mechanisms. Sepsis causes generalized vasodilatation and renal hypoperfusion which leads to AKI.

Our results are compatible with results of studies conducted in other developing countries of Asia and Africa. Sepsis is found to be the most common cause of PPAKI in developing counties which is probably due to poor healthcare system. A similar study conducted in India reported sepsis as leading cause of PPAKI. Sepsis was found 70% causes of post-partum AKI, followed by DIC 55.5%, pre eclampsia/eclapmsia 40.7% and postpartum hemorrhage 40.7%[13]. Goplani et al noted puerperal sepsis as the most common etiology of postpartum AKI in 61% of women[14].

Unlike the developing counties, studies conducted in developed countries shows a quite different spectrum. TMAs, Pre-eclampsia/ eclampsia, HELLP and hemorrhage are more prevalent in these counties. Meibody F. et al conducted a similar study in France which explored pre-eclapmsia as the most common cause of AKI in 38% patients followed by Postpartum hemorrhage 31% and thrombotic microangiopathy in 13.3% patients[15]. A study conducted in Brazil reported causes of AKI as; pregnancy induced hypertension (PIH) in 41.8% , HELLP syndrome in 40%, Puerperal sepsis in (14.5%), placenta abruption in (9.1%) and HUS (9.1%)[16]. In a study conducted in China hemorrhagic shock (31%) and severe pre-eclampsia (18%) was found to be the most common cause of post-partum AKI[17].

Khattak et al studied pregnancy related renal failure in Pakistani population. He described causes of pregnancy related AKI, not specifically post-partum AKI. In this study, sepsis was the most common cause of pregnancy related AKI in Pakistani population (31.8%)[18].

In our study 80% patients required hemodialysis which was compatible to data from India. In an Indian study 92% patients of PPAKI required hemodialysis. In our study 68.5% patients achieved complete recovery of renal functions while in Indian study 40% of patients reached to complete recovery. In our study 5% of patients became Dialysis dependent while 7% patients in the respective study[13]. Mortality was found quite low (1.6%) in out setup comparing with Indian study where mortality was 18.5%.[13]

In our study, PPAKI is more common in low economical group (80%), in patients belonging to rural areas (65%) and uneducated group (46.6%), it is probably due to lack of health awareness in population lack affordability and accessibility to medical facilities. But these demographic characteristics are not studied in other similar studies to best of our knowledge.

CONCLUSION

Sepsis is the most common cause of post-partum AKI in our study which is due to poor maternal care. These facts emphasize to improve healthcare system in Pakistan.

Author's Contribution:

Concept & Design of Study:	Khawar Sultan
Drafting:	Zainab Maqsood
Data Analysis:	Muhammad Sajid Rafique Abbasi, Kanza Kanwal, Meshaal Azhar, Faryal Azhar
Revisiting Critically:	Khawar Sultan, Zainab Maqsood
Final Approval of version:	Khawar Sultan

Conflict of Interest: The study has no conflict of interest to declare by any author.

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